



Children's  
Environmental  
Health Center

## **ARTIFICIAL TURF AND CHILDREN'S HEALTH**

**Written Testimony to the Environment Committee re Proposed Bill No. 924**

**Submitted by**

**The Center for Excellence in Children's Environmental Health**

**at the Mount Sinai School of Medicine**

**March 2, 2009**

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## Protecting Children Against Environmental Threats to Health

Over the past five years, several hundred artificial turf fields have been installed on the East Coast. Cities, towns and school districts installed these fields to improve the quality of playing fields and accommodate sports programs. The newest generation of these fields have been constructed of a material termed "crumb rubber", which is made from ground up car and truck tires.

The Clinical Center of Excellence in Children's Environmental Health at Mount Sinai School of Medicine has received numerous phone calls from concerned parents and physicians regarding the wide scale use of artificial turf fields on school grounds and in parks properties. This has prompted the Center to undertake a detailed assessment of the risks and benefits of artificial fields. The findings we present today are the result of this evaluation.

Our first finding, perhaps the most important, was that decisions to install synthetic turf fields were for the most part made without due diligence - without any analysis of potential negative consequences of turf fields. A number of these very expensive fields were installed with little or no consideration of possible negative effects. Now, we are suddenly, and belatedly, beginning to realize that synthetic turf fields may, in fact, be associated with health problems in children. The most important of these hazards that we identified through our study are:

**1. Extreme heat.** On hot summer days, temperatures of over 130 degrees Fahrenheit have been recorded a few feet above the surface of synthetic turf fields - precisely at the altitude where children play. Vigorous play in these conditions conveys a very real risk of heat stress or heat stroke.

**2. MRSA skin infections.** Outbreaks of skin infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) have been documented in children who play on synthetic turf fields (reported in the *New England Journal of Medicine*, February 2005).

**3. Inhalation and ingestion of toxic and carcinogenic chemicals.** The major chemical components of crumb rubber are styrene and butadiene, the principal ingredients of the synthetic rubber used for tires in the United States. Styrene is neurotoxic. Butadiene is a proven human carcinogen. It has been shown to cause leukemia and lymphoma. The crumb rubber pellets that go into synthetic turf fields also contain lead, cadmium and other metals. Some of these metals are included in tires during manufacture, and others picked up by tires as they roll down the nation's streets and highways. There is a potential for all of these toxins to be inhaled, absorbed through the skin and even swallowed by children who play on synthetic turf fields.

**Lead** was recently found in synthetic turf fields in New Jersey at levels so high that several fields were closed by the state Health Department. This is extremely alarming since lead is a highly toxic chemical and brain injury is the most serious consequence of pediatric lead poisoning. Young children are especially vulnerable to lead because their brains are rapidly growing and developing, and because their normal hand-to-mouth behavior increases the risk that they will take lead into their bodies from the environment. Even low-dose exposure to lead can possibly cause loss of IQ, shortening of attention span and disruption of behavior as well as increased risk of dyslexia and school failure.

**4. Transportation home of crumb rubber pellets.** Crumb rubber pellets do not remain on the artificial turf fields. These pellets are picked on children's shoes, clothing and skin. They are then tracked into children's homes and cars, and they are carried into the places where children live, play, eat and sleep. Thus exposure can continue for many hours beyond the time that a child spends in play on the synthetic turf field.

**5. Escape of chemical hazards from fields to the environment.** A number of the toxic and chemical components of the crumb rubber that is installed in synthetic fields are soluble in water. When rain and snow fall on synthetic fields, these materials can leach from the fields to contaminate ground water and soil.

**6. Disposal.** A further unresolved issue is what to do with the toxic components of synthetic turf fields 10 or 20 years from now when the fields reach the end of their usable life-span and need to be dismantled. Will the crumb rubber need to be dealt with as hazardous waste, since it contains toxins and carcinogens? Will it need to be placed in a hazardous waste landfill? What will disposal cost? Who will pay? None of those questions have been properly considered.

The potential long-term consequences of exposures to synthetic turf fields have not been carefully assessed by independent third parties before synthetic turf fields were installed. Citizens and school boards should question the wisdom of installing synthetic turf until a credible independent study has been conducted and published.

For these reasons, we recommend that Hartford, Connecticut carefully weigh the risks and benefits of artificial turf prior to wide scale implementation. We must protect, increase and upgrade the limited number of natural grass fields currently available to our children. This is critical for the health of Hartford, Connecticut children and ultimately good for the environment as well.

Thank you for the opportunity to submit testimony at this important hearing. We would be more than happy to answer any questions that you might have.

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*Protecting Children Against Environmental Threats to Health*

## What to Know About Turf Fields

### Which turf fields are of concern?

Not all turf fields are constructed the same way. Second generation turf fields are layered synthetic surfaces. Of concern are the "infilled" fields, which consist of blades of plastic green grass infilled with a mixture of crumb rubber pellets and sand or just crumb rubber.

### What is infill crumb rubber?

Infill crumb rubber consists of tiny black pellets or granules, approximately 1 mm in diameter. The granules are often made from recycled tires and are spread two to three inches thick over the field surface. Note that each company has its own installation method and source for crumb rubber, so there will be variation from field to field. The rubber may be ethylene propylene diene monomer rubber (EPDM), Block copolymers based on styrene and butadiene (TPE-S) or styrene butadiene rubber (SBR).

### What are the main prove concerns?

Proven hazards to children's health are two: (1) Heat and (2) "turf burns" or abrasions. Temperatures on these fields have been shown to get as high as 160° F. It is unsafe for children to be playing on surfaces when temperatures are this high. Athletes playing on turf fields have been shown to have more abrasions or "turf burns," which in turn can harbor infection.

### What chemicals can be released by the infill rubber?

Recycled tires are known to contain a mix of chemicals, some of which are cancer-causing, others that are known to cause birth defects. These chemicals include rubber chemicals, polycyclic aromatic hydrocarbons (PAHs) and heavy metals - lead and cadmium. What is not yet known is the extent to which these chemicals may get in to the bodies of children playing on turf fields, their associated health risks, or the extent to which they may leach from the fields into the surrounding environment, soil and groundwater.

### How can people be exposed to these chemicals?

The main routes of exposure are through inhalation and ingestion. Athletes are expected to have the greatest exposure level due to high ventilation rates associated with exercise and the possibility of inhaling dust particles kicked up by their play. People on the sidelines will have lower exposures, however young children should be monitored to prevent ingestion of the rubber pellets. It is also possible for the pellets to be tracked off the fields and into homes and washer and dryers.

### Tips for safer use of turf fields:

- Do not use the turf fields on extremely hot days.
- Be sure to clean and monitor any "turf burns" obtained while playing.
- Attempt to remove all pellets from shoes and clothes prior to leaving the fields.
- At home, shake out your children's equipment and clothes in the garage or over the garbage.
- Have your child shower and wash thoroughly after playing on the field.

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**BISPHENOL A (BPA) AND CHILDREN'S HEALTH**

**Proposed BILL No. S.B. 791**

**MOUNT SINAI CHILDREN'S ENVIRONMENTAL HEALTH CENTER**

**March 2, 2009**

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*Centers of Excellence in Children's Environmental Health*

**Dear Chairs Senator Ed Meyer, Representative Richard Roy, and Members of the Environment Committee,**

**We appreciate the invitation to discuss the hazards of Bisphenol A. I am Maida Galvez, MD, MPH, Region II Director of the Pediatric Environmental Health Specialty Unit. The testimony that I am presenting today reflects my views and those of my colleagues of the Mount Sinai Center of Excellence in Children's Environmental Health.**

**In the face of growing economic challenges, an area for which there can be no compromise is children's health. There is an urgent need to invest in primary prevention strategies today in order to ensure the health of future generations to come.**

**We therefore urge the Legislature to support a ban on the plastics chemical, Bisphenol A (BPA) in Hartford, Connecticut. We have the ability to prevent exposures to this toxic chemical in the places it matters most: where children live, learn and play. Environmental exposures in these settings have been found to contribute to childhood conditions as well as diseases of adult onset.**

**Overview of Bisphenol A (BPA)**

*Bisphenol A* is a plastics chemical produced in a volume of millions of pounds per year. BPA is found in linings of canned foods including ready-to-eat infant formulas, and in hard plastics made of polycarbonate (found in sports water bottles, water dispensers and baby bottles). The primary source of exposure varies by age, gender, developmental stage and individual behavior. For BPA, the primary route of exposure is probably ingestion.

Since these substances are not chemically bound to the plastics to which they are added, they can leach out of products causing exposure through ingestion of foods found in plastic packaging, or mouthing of products. Exposure of BPA-containing products to high temperatures – as occurs with heating or sterilizing baby bottles in the microwave – promotes leaching of the chemicals. Young children may be uniquely vulnerable to these exposures as they frequently place toys and other plastic products in their mouths, an age appropriate behavior.

**Exposure to BPA is Widespread**

The Centers for Disease Control and Prevention (CDC) tracks exposures to many environmental chemicals in a nationally representative sample of people ages 6-85 years old (CDC 2008). Measurements of BPA metabolites in the urine are included in the CDC report. Nearly all Americans have measurable concentrations of BPA in their bodies.

**Children are at Risk for Exposure to BPA**

Children and adolescents have disproportionately high levels compared to adults; the reasons for these differences remain unclear. Possible explanations include varying routes and sources of exposure, differences in metabolism, or a combination of these factors.

The half life for BPA is very short, indicating that these chemicals are rapidly cleared from the body. Urine tests to assess exposure to BPA are currently conducted for research purposes

only. Studies suggest that a one-time measurement of urinary levels is likely to be a good measure of long-term exposure given the relative constancy of exposures in children's daily lives (Teitelbaum 2008). There is as yet no clinical reference level to indicate what level of exposure is associated with human health effects. Further research is needed in this area.

### **Health Effects Due to BPA Exposure**

Due to the widespread use of these chemicals as well as evidence of universal exposure in the US population, concerns have been raised that young children may be vulnerable to developing long-term health effects. Many studies in animals show an association of exposure to BPA, even in small amounts, to adverse health effects including neurobehavioral disorders including hyperactive behavior, (Ishido 2004) and learning (Carr 2003), obesity (Masuno 2005), altered insulin sensitivity (Roper 2008), and cancers of the breast (Markey 2001, Vandenberg 2007), prostate (Maffini 2006, Prins 2008) and uterus (Maffini 2006, Newbold 2007). Human studies for BPA, however, are extremely limited. A recent study of adults reported a relationship of high BPA exposures and heart disease, Type 2 diabetes, and abnormal liver function tests (Lang 2008). BPA has not yet been classified with respect to carcinogenesis in humans (IARC 1989, 1999).

The US Food and Drug Administration (FDA) published a draft risk assessment of BPA in August 2008, concluding that the chemical was safe as currently used. This was in contrast to the conclusion of many other scientists. The National Toxicology Program, part of the US Department of Health and Human Services, has voiced concern about BPA's effects on the brain, behavior and the prostate gland in fetuses, infants and children. The FDA has recently agreed to reconsider the risks of BPA (Scelfo).

### **BPA Legislation**

The full range of Bisphenol A toxicity in humans is not yet known due to the lack of human studies. Due to the uncertainty in predicting total BPA exposure of infants and very young children through ingestion and mouthing of BPA, in 2008 Canada recommended removal of BPA from infant bottles, food packaging and toys intended for mouthing as a precautionary measure. No such legislation exists in the US or the European Union.

In this instance, the Canadian government has taken a precautionary approach, refusing to wait until human studies confirm the health effects already seen in animals. These measures have been enacted to protect our most vulnerable populations, infants and toddlers at critical stages of development, and hence at greatest risk for a wide range of potential health effects.

### **Protecting the Health of Children**

Hartford, Connecticut has the opportunity to join the ranks of Canada in clearly stating that children's environmental health is a top priority and Hartford, Connecticut will not continue to allow products to be tested in the global market to see whether decades later there is the potential for harm.


We must ensure that toys and products used regularly by children are free from chemicals such as BPA. Legislation banning the use of BPA in children's bottles, toys and products will protect the health of generations of children.

Thank you for the opportunity to submit testimony at this important hearing. We would be more than happy to answer any questions that you might have.

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## A Guide to Plastics For Easy Reference

### Front of card


Pocket Guide to Plastics  Guía del Bebido a los Plásticos

Growing Up Healthy  
(212) 241-3125  
Creciendo Saludable

safer Plastics  
Plásticos Más Seguros




 PETE	 HDPE
 LOPE	 PP

### Back of card

Pocket Guide to Plastics  Guía del Bebido a los Plásticos

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Creciendo Saludable

Plastics to Avoid  
Plásticos Que Deben Evitar

 V	 PS
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## Mount Sinai Community Health Bulletin



Mount Sinai  
COMMUNITY  
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### Quick Guide to Safe Plastics

Staying Healthy is a Changing Environment #3

All plastics are not the same. Some are safer than others. When plastics come in contact with food and water, they can leak certain chemicals. The Growing Up Healthy Pocket Guide to Plastics can be used while shopping to help you make the best choices for you and your family.

Check the symbol on the bottom of plastic items before you buy:

The safer plastic choices for food and beverages



Plastics to try to avoid



Other tips for the safe use of plastics:

1. Try not to use plastic containers in the microwave. If you can, it's safer to use glass or ceramic containers.
2. Beware of using plastic wraps in the microwave. A safer choice is waxed paper.
3. Try to reduce your use of products made of PVC, vinyl or Styrofoam.

For more information, contact Dr. Luz Claudio or Reeve Clace (212) 241-1223 reeve.clace@msm.edu

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